ICFO

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SPECIFICATION SHEET

SUPPLY, INSTALLATION AND STARTING-UP OF A "HIGH-POWER, TUNABLE, FREQUENCY-DOUBLED 397 NM DIODE LASER SYSTEM" FOR ICFO'S LABORATORY THROUGH AN OPEN PROCEDURE NOT SUBJECT TO HARMONIZED REGULATION

FILE NUMBER: 2024.SU.009

Contents

CLAUSE 1. Object of the contract

The purpose of this contract is the supply, installation and commissioning of "high-power, tunable, frequency-doubled 397 nm diode laser system" for ICFO'S laboratory (group of Morgan Mitchell, Atomic Quantum Optics). The types of items supplied are linked to the CPV (Common Public Procurement Vocabulary), **38000000-5** Laboratory, optical and precision equipment (except glasses).

CLAUSE 2. Needs to satisfy

We request a high-power, tunable, frequency-doubled 397 nm diode laser system. We are looking for grating-stabilized external-cavity diode laser (ECDL) operating at 795 nm, amplified in a tapered semiconductor chip (TA – tapered amplifier) and coupled into a resonant second harmonic generation (SHG) stage, where a selected non-linear crystal generates CW laser light at half the wavelength of the fundamental laser.

The requested laser system will be used to generate polarization squeezed light by pumping PPKTP crystal with a 397 nm light. This requires high quality laser, which detailed specification is characterized in CLAUSE 3 – Technical requirements. Interchangeably, high power 795 nm light (Rubidium D1 line) will be used in experiments with hot rubidium vapours and cold atoms.

The system will be installed in the laboratory of the research group: Atomic Quantum Optics (prof. Morgan Mitchell).

CLAUSE 3. Technical requirements

We list below the requirements for the requested laser system. In case that the offer does not fulfil all the requirements indicated, it will be automatically excluded from the tender.

- Main specifications on the laser diode and optics:

    1. Design wavelength: 397 nm
    2. Output power (397 nm): 1.2 W
    3. Output power (795 nm): 4 W
    4. Coarse tuning: 2 nm (396 nm - 398 nm)
    5. Linewidth (5 µs): < 200 kHz
    6. Frequency stability: < 200 MHz/K
    7. Mode hop-free tuning: > 5 GHz
    8. Polarizing beamsplitter and λ/2 plate for tuning the ratio between TA Master Output Power and SHG output power.
    9. Beam shaping of SHG output.
    10. Fiber-coupled SHG output and high power fiber (allowed input power of 1200 mW). Output power out of the fiber: 800 mW.
    11. Fiber-coupled 795 nm output.
    12. High quality optical isolators to protect the master laser and the tapered amplifier.
    13. Doubling resonator SHG with temperature controlled, AR coated crystal.

- Main specifications on the electronics and control systems:

    14. Stabilisation of SHG resonator length and automatic relocking to the correct resonator mode.
    15. System of automatic optimization of input beam steering into TA, SHG and fiber-coupled 397 nm output.
    16. Frequency locking system (to an external reference). PIDs for each connected laser to address e.g. piezo and current.

17. Low noise current, temperature and piezo drivers (4 A driving current for amplifier chip). Current noise density: at the order of 300 pA / √ (Hz) @ 1 kHz.
18. Control systems (by integrated CPU & FPGAs) for scanning, signal display, locking, etc.
19. No need for water cooling.

- Other:

20. On-site Installation and Training.

CLAUSE 4. Power distribution and safety

The system should be configured for EU (Spain) power grid (voltage, sockets, etc.) and be CE marked.

The system will be fully protected against unexpected power cuts and, in that case, will be fully safe for the operators. A quick and easy turning on of the system has to be possible after a power cut.

CLAUSE 5. System layout and services

The contract winner will include in the proposal:

a) a complete set of pictures, drawings and layouts of the system, including dimensions, location and details of the different components,
b) full installation and start-up requirements,
c) transportation to ICFO's facilities including insurance and all export/import and customs duties,
d) onsite installation of all the system, and will install it in a way to guarantee the optimal requested specifications here listed
e) lifetime free remote service to be requested whenever needed by ICFO personnel in order to optimize any part of the requested system, whenever optimization of the setup is possible and does not require a service visit in person by the contract winning company.
f) a full warranty valid 12 months on all parts and components of the system. The warranty will include the replacement of any faulty or damaged part(s) during normal use of the system. It will cover any cost related with the disassembly, transportation, reparation and re-assembly of the damaged component(s), including all travelling and living costs of the required service engineer(s).
g) lifetime free follow-on support and updates on all the provided software packages for the whole laser system, when software intrinsic bugs are influencing the usage or there are updated versions with better performance available for the purchased hardware.

The laser system will be placed in the selected location by ICFO in Spain. Contract winner will cover all costs, organization and coordination of laser system placement, including any required specialized equipment or vehicle, and any required component disassembly and reassembly for system unloading and transportation inside the building.

The contract winner will give training to ICFO personnel to operate the full system, to run daily maintenance and to re-align the system in order to obtain optimal performance of the system. The number of training days and approximate schedule will be specified in the proposal.

Spare parts, components and subsystems will be available during, at least, 10 years after system supply.

CLAUSE 6. Transport, delivery and installation time

- The proposal will include transportation to ICFO's facilities and all export/import and customs duties. **DAP incoterms will apply.**

- The system must be delivered and installed at ICFO in no more than **12 weeks**. Delivery time is defined as the time elapsed since the signature of the contract until the system delivery at ICFO facilities. It includes the manufacture of the system, the transportation, the installation and the acceptance test at ICFO's premises.

CLAUSE 7. Technical proposal structure

The proposal has to follow as much as possible the structure of this technical requirements document to facilitate evaluation. Any optional accessories not included in the proposal will have to be put in a separate section, and not mixed with the included items.

CLAUSE 8. Target price

- The target price for the system is 105.000,00 € (VAT excluded).
- Payment terms:
    - 100% after installation training and acceptance.

Castelldefels, on the date of its digital signature

Prof. Dr. Morgan Mitchell
GL Atomic Quantum Optics